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Castnet Fishing with the Help of Irrawaddy Dolphin, *Orcaella brevirostris*, In Myanmar

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ABSTRACT

Fishing with the help of Irrawaddy dolphins is unique to Myanmar. Irrawaddy dolphins, *Orcaella brevirostris*, which live in about 74km segment of the Ayeyawady (previously known as Irrawaddy) in upper Myanmar help fishermen who use castnets for fishing. A total of 51 castnet fishermen from six villages can do fishing with the dolphins and about 21 dolphins in this river segment help the fishermen. Dolphins and fishermen communicate by audio and visual signals during the fishing. Fishermen can catch more fish with less fishing effort and dolphins can also feed easily on those fish which are stunned by the net throws. Irrawaddy dolphins have been protected by law in Myanmar since 1994. Nowadays, cooperative fishing practice between the Irrawaddy dolphins and castnet fishermen in Myanmar has been threatened with extinction by illegal electric fishing. It is an urgent need to study aquatic noise signals of dolphins, impacts of signals used by fishermen in communication with the dolphins and other noises such as boat noise on both dolphins and cooperative fishing practice.

KEY WORDS: Irrawaddy dolphin, fishing with dolphin, Myanmar

INTRODUCTION

The Ayeyawady river was previously known as Irrawaddy river. The river is formed by the confluence of two rivers, N'Mai Kha in the east and Malika, in the west at 25°45'N in northern Myanmar. It flows southward and then it enters the Andaman Sea by nine main mouths. It is the longest river in Myanmar and a significant fact is that the whole 2170 km river lies within the country. Age of the Ayeyawady river is estimated to be 45 million years.

Irrawaddy dolphins live in both freshwater of Ayeyawady River and marine water in coastal areas of Myanmar. The dolphins live between Bhamo and Mandalay segment of the Ayeyawady River in upper Myanmar but only those living in a 74 km-long Kyauk Myaung to Mingun segment know the cooperative fishing technique with castnet fishermen and they participate in fishing (Tun, 2003; Tun, 2004; Tun, 2006) (Fig. 1 and 2). Cooperative fishing is a mutually beneficial technique for both humans and dolphins. Fishermen can catch more fish with less fishing effort and dolphins can also feed easily on those fish which are stunned by the net throws. Castnet fishermen who fish with the help of Irrawaddy dolphins have a high regard for the dolphins as their parents because dolphins indirectly earn money for the fishermen family.

This fishing practice is unique to Myanmar and the Irrawaddy dolphins have been protected by law in Myanmar since 1994. But this fishing practice and the dolphins which know the fishing technique have been threatened with extinction by illegal electric fishing. It is important to conserve the declining dolphin population which is estimated as at least 21 dolphins live in the 74 km-long segment. Fishing technique and communication between the dolphins and fishermen will be described in this paper.

MATERIALS AND METHODS

Castnet fishing with the help of Irrawaddy was studied at Hsithe, Myit kan gyi, Myayzun villages which are situated in the 74 km-long segment of the Ayeyawady River in upper Myanmar (Fig.1). The researcher went to the villages by a motorized boat and anchored near the village on the Ayeyawady River. Fishermen who use castnets for fishing and know the fishing technique with dolphins were also stationed with the researcher. The researcher and fishermen used a small wooden boat without engine power. Binoculars are used to find the dolphins from the upper deck of the boat. The observer studied the fishing technique by direct observation on the fishing events and interview with fishermen.

RESULTS

FISHING WITH IRRAWADDY DOLPHIN

The dolphins help only in castnet fishing. There are two fishermen in a boat. Net man took position at bow and rower took position at stern. When the dolphins are sighted, the fisherman starts to follow the dolphins and try to call them by a small conical wooden pin to help in their fishing. This remarkable

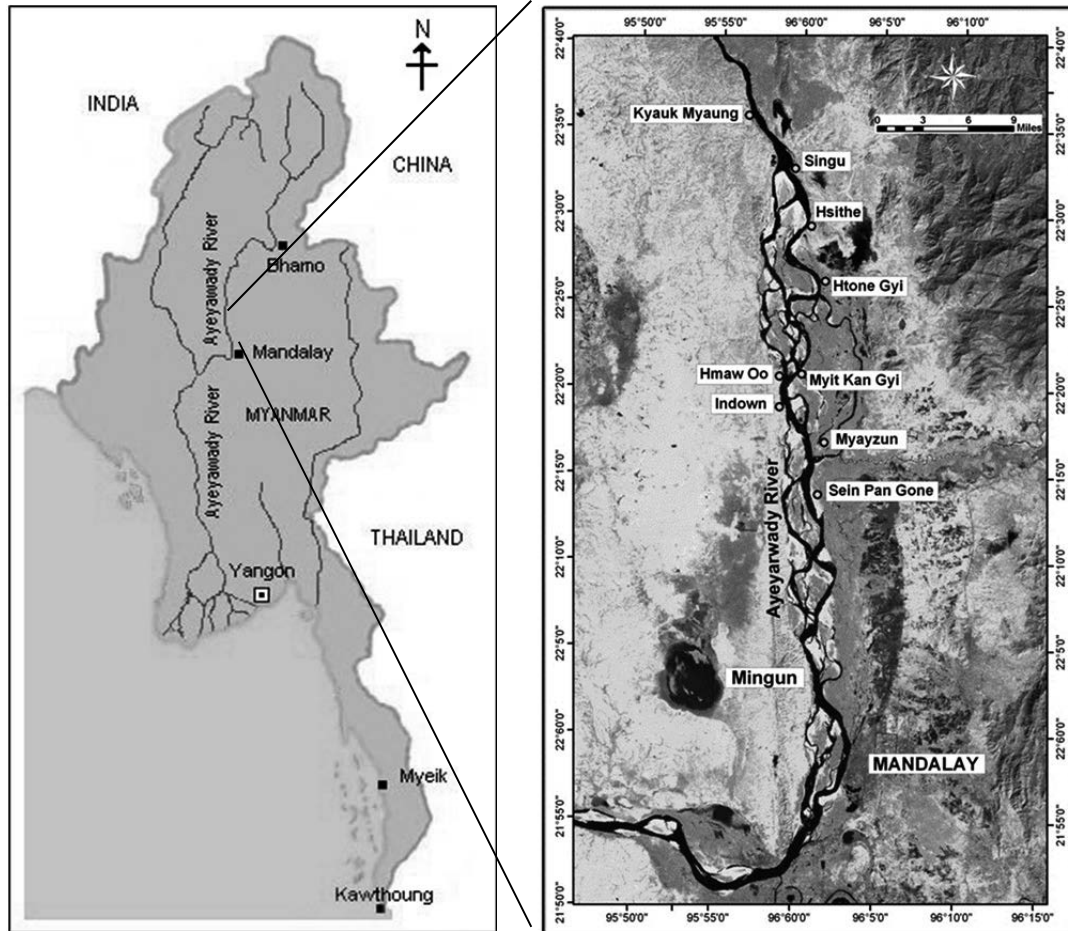


Fig. 1. Map showing Bhamo and Mandalay towns and, the river segment between Kyauk Myaung and Mingun of the Ayeyawady River.



Fig. 2. Castnet fishing with the help of Irrawaddy dolphin in upper reaches of the Ayeyawady River.

fishing technique with the dolphin has been practiced for more than a century and it has been passed from generation to generation in both dolphins and fishermen in nature. A total of 51 castnet fishermen from six villages can do fishing with the dolphins and about 21 dolphins help the castnet fishermen.

During the cooperative fishing, fishermen and dolphins communicate with each other. Fishermen use conical wooden pin (Fig. 3), castnet (Fig. 4), paddle (Fig. 5 and 6), and mouth whereas dolphins send signals to the fishermen by aerial display of its body parts during the cooperative fishing. Signals sent by fishermen and dolphins are tabulated in Table 1 and 2.



Fig. 3. Call sound signal made by tapping a wooden conical pin on the side of fishing boat.



Fig. 4. Making a splash sound with net throw.



Fig. 5. Making a splash sound with a paddle by chopping water surface.



Fig 6. Making a splash sound with a paddle by scrapping on the water surface.

FISHING TECHNIQUE

The main strategy of cooperative fishing technique with Irrawaddy dolphin is: fishermen are positioned at a river-bank or sand-bank side while dolphins are positioned at mid-water side of the river in order to trap fishes against the fishing boat(s) and river/sand bank. Dolphins herd fish and drive them towards the fishing boats (Fig. 7).

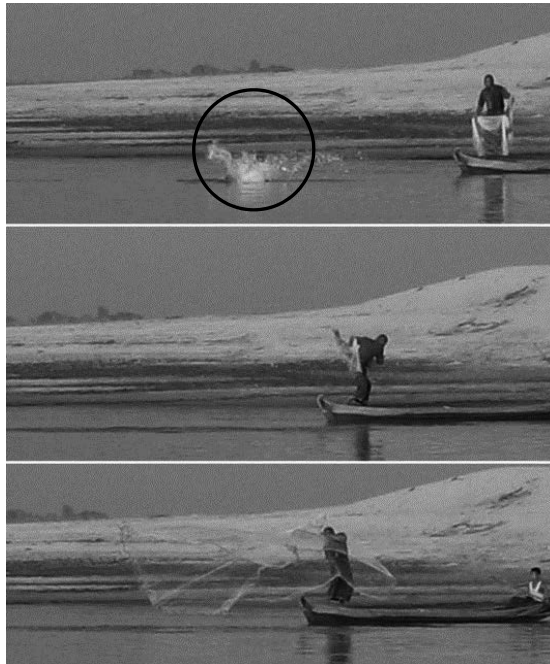


Fig. 7. Cooperative fishing technique with the help of Irrawaddy dolphin. Dolphin drives fishes with its lateral wave of its fluke towards castnet fishing boat (top; dolphin in circle) and then fishermen throw his net (middle and bottom).

A castnet fishing episode with the help of the Irrawaddy dolphins can be divisible into three phases. They are: (1) Attracting phase, (2) Fishing phase and (3) Terminating phase.

(1) Attracting phase

This is the initial phase of the cooperative fishing. Fishermen try to call dolphins to help them when they see the dolphins passing their village or their fishing in the river. They follow the dolphins in their boats and make 'call' sounds with a conical wooden pin (Fig. 3), lead weight of the castnet and guttural sound with their mouth on the way. They also make some noise by striking lead weights of castnet on the floor of their boat. They throw their nets occasionally to let the dolphins know that they are castnet fishermen and where they are fishing. If fishermen can successfully attract or call the dolphins, they can get cooperation from the dolphins. Sometimes, dolphins do not care their call and keep on swimming in their headed direction. If dolphins are interested in the fishermen's call, dolphins stop swimming towards their headed direction. Fishermen need to keep on calling

dolphins in order to engage with them for cooperative fishing. As this is an initial phase of the cooperative fishing, fishermen try to be successful in attracting dolphins, otherwise, all their attempts in this phase would be in vain.

(2) Fishing phase

In this phase, the dolphins respond to the fishermen call with their fluke signal and engage in fishing. Dolphins herd fish and then drive them towards a fishing boat by a forceful lateral wave of halfway-submerged fluke in the direction of a fishing boat at a net-throw distance. The forceful fluke-wave is a signal from the dolphin to the castnet fishermen telling that it is the time to throw the net. The fishermen keep sending signals made with mouth and paddle so as to keep attracting dolphins and continue their fishing with the help of the dolphins. It is needed to attract the dolphins till the termination of cooperative fishing.

Cooperation and timing between the two fishermen in a boat is also important to get a good catch. Because of the rower in stern, net thrower can be out of balance to throw a good cast or short of distance in response to the dolphin signal to throw his net. Dolphins render their help not just for one throw. Several throws can be done as long as the dolphins are attracted and interested in cooperation.

Sometimes, only one boat fish with dolphins and sometimes, a several fishing boats take part in the fishing. In latter case, fishermen follow conventional net throwing order and there is understanding on who has the right to throw his net first. In general, fishermen on the nearest or head fishing boat has a right to throw net first and then the rest can throw their nets in order. The first boat must queue at the last position of the fishing boats when it has finished its net hauling. By following the queuing order, fishing boats can throw their nets one after another in serial order and can avoid dispersal of fishes by net throw from other fishing boats.

The dolphins eat fish while they are herding fish and they eat dispersed fish that escaped from the net while fisherman is casting and pulling his net.

(3) Terminating phase.

In this phase, dolphins show no more interest in cooperative fishing by neglecting the fishermen's signals and swim away, or fishermen stop sending signals to dolphins. Cooperative fishing comes to an end when fishermen or dolphins terminate the fishing. However, other fishing boats which want to continue or conduct cooperative fishing will make signals to keep dolphins staying with them and to help them.

DISCUSSION

Threats to the Irrawaddy dolphins in upper reaches of the Ayeyawady River are gillnets, electric fishing, gold mining and scarcity of food. Electric fishing is an illegal fishing practice in Myanmar. Nowadays, electric fishing becomes a major threat to both dolphins and the unique practice of cooperative fishing practiced between Irrawaddy dolphin and castnet fishermen and even 30 – 40 electric fishing boats can be found in the 74 km- long dolphin protected area. The electric fishermen are armed and travel in a large group and, they threaten and attack fishery officials over illegal fishing investigation. Fisheries department was struggling to bring it under control but cooperation and collaboration among agencies concerned and law enforcements are very weak (Phyu, 2012; Lwin and Soe, 2013).

Accidental killing of the Irrawaddy dolphins in upper reaches of the Ayeyawady River has been reported and it was found that 12 out of 26 dead dolphins reported between 2001-2013 were confirmed caught in gill nets.

Irrawaddy dolphins have been protected by Law in Myanmar since 1994. The State Law and Order Restoration Council enacted Law No. 6794, titled "The Protection of Wildlife, Wild Plant and Protected Areas Law" on 8th. June, 1994. In accordance with the Law, Forest Department of Ministry of Forestry of the Union of Myanmar issued a list of Protected Animals by 26 October 1994 dated Notification No. 583/94. The Irrawaddy dolphin *Orcaella brevirostris* is listed under "Completely Protected" category.

Official Protected Areas for the Irrawaddy dolphin has not been established in Myanmar yet. But, the Director General of Department of Fisheries, Ministry of Livestock and Fisheries, issued Notification No. 11/2005 on 28th. December, 2005 and it prohibits fish catching with some fishing implements which are mentioned in the notification, in a segment of the Ayeyawady river between Kyauk Myaung and Mingun towns in order to prevent the extinction of Irrawaddy dolphin and to safeguard the dolphins.

The Notification mentioned prohibited fishing implements and they are:

1. Gillnet obstructed in water-course,
2. Gillnet stretches from bank to bank of the river,
3. Driftnet longer than 300 feet
4. Fishing implements and fishing methods that prohibited by the Department of Fisheries from time to time.

It is stipulated that fishermen shall make a gap more than 600 feet between net by net which are not the prohibited implement. The notification also prohibits the catching and killing of Irrawaddy dolphins and trade

and whole or parts of them. It also instructs that in the case of the dolphin being accidentally caught by fishing net, fishermen shall release them alive without delay.

Department of Fisheries has issued special Irrawaddy dolphin fisherman card to those castnet fishermen who fish with the help of Irrawaddy dolphin. They can fish any place within the virtual protected area between Kyauk Myaung and Mingun segment of the Ayeyarwady river. The department is also doing monitoring and awareness raising trips.

Regarding cooperative fishing, dolphins are now difficult to call to take part in castnet fishing because of the bad electric fishing practice. Even, engine noise from fishing boats scares the dolphins causing them to swim away in panic. As a consequence, cooperative fishing with the help of Irrawaddy dolphin is threatened and may be lost. The local freshwater population of the Irrawaddy dolphins in the Ayeyawady River of Myanmar has been placed under the “Critically Endangered” status of the IUCN Red List of threatened species.

Though acoustics signals are used in human-dolphin communication and, sure to say, among the dolphin themselves, any scientific study on the aquatic noise has not been done in Myanmar yet. Therefore, it is an urgent need to study the aquatic noise signals of dolphins, impacts of signals used by fishermen in communication with the dolphins and impacts of other noises such as boat noise on dolphins before the extinction of this century old, unique and good fishing practice in Myanmar.

ACKNOWLEDGEMENT

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Table 1. Signals from fishermen.

Signal	Making	Meaning
1. Series of striking sound	This sound, <i>trat tat tat tat....</i> , like a series of short-pulsed decrescendo drum rolls, is made by striking on a side of boat with a conical wooden pin. (Fig. 3)	Come and help.
2. Guttural sound	Fishermen make this sound (<i>Karururu..</i>) by his mouth.	1. Come and help. 2. We are fishing and we are ready.
3. Striking sounds (lead-weights)	Striking on a side of boat or on the floor of boat with lead-weights attached at the fringe of a castnet.	1. Come and help. 2. We are cast-net fishermen.
4. Splash sound (net throwing)	Throwing cast-net. (Fig. 4).	We are cast-net fishermen and we are fishing here.
5. Splash sound (chopping)	The water surface is chopped with an edge of paddle's flat. (Fig. 5)	1. Not ready to throw yet. 2. Show up where you (dolphins) are.
6. Splash sound (scrapping)	Water surface is scraped with a flat end of a paddle to make a splash sound. (Fig. 6)	1. Swim downstream or upstream along with fishing boat(s) because we do not like the current location to throw net. 2. Suspend fluke strike as we are moving to a desired location.

Table 2. Signals from dolphins.

	Signal	Making	Meaning
1.	Turning back	Dolphin stops swimming to its heading direction and swim back to the direction from where it comes; usually not so fast swimming.	Heard the fishermen's call.
2.	Swimming around	Dolphin swims around nearby the fishing boat.	Engages fishing and it is herding fish.
3.	Slapping	Dolphin slaps water surface with its fluke.	Dolphin is herding fish. Get ready.
4.	Frequent Slapping	Dolphin slaps water surface with its fluke whenever it is surfacing.	Small fish school/ Fishes are small.
5.	Fluke waving	Dolphin waves its fluke like a fish. The fluke is in semi-submerged position.	Throw net.
6.	Strong fluke wave	Dolphin waves its fluke like a fish strongly.	1. Able to control a shoal of fish. 2. Big fish school/Fishes are big. 3. Throw net.
7.	Weak fluke wave	Dolphin waves its fluke like a fish weakly.	1. Could not able to control fish very well. 2. Fish are small. 3. Throw net.
8.	Body exposing	Surfacing its body shortly after fishermen's splash-sound signal made by chopping water surface (see signals from fishermen)	I'm here.